

Appl. No. 10/617,572  
Amdt. Dated January 17, 2006

Attorney Docket No.: BAT-102  
Reply to Office Action of October 17, 2005

#### AMENDMENTS TO THE SPECIFICATION

Please replace the paragraph beginning on page 3, line 27 and ending on page 4, line 21 with the following amended paragraph:

- 5 At least one of elements 130 includes a first switchable element 170. First switchable element 170 may be activated ~~between~~ between a number of unique states, where for each state, first switchable element 170 is capable of performing a unique optical transform (or filter function). ~~Preferably~~ Preferably, first switchable element 170 may be activated between two states, however, in general, any number of states may be utilized by first switchable element 170.
- 10 ~~Preferably~~ Preferably, the transform performed by first switchable element 170 is similar to that of a thin lens. For example, first switchable element 170 may be activated into a first-switchable-element first-state (FSE 0-state), having the property of an FSE 0-state focal length 180. Similarly, first switchable element 170 may be activated into a first-switchable-element second-state (FSE 1-state) having an FSE 1-state focal length 190. First Module 120 may also
- 15 incorporate a second switchable element 200. Second switchable element 200 may be activated into a second-switchable-element first-state (SSE 0-state), having the property of an SSE 0-state focal length 210. Similarly, second switchable element 200 may be activated into a second-switchable-element second-state (SSE 1-state) having an SSE 1-state focal length 220. In this fashion, First Module 120 may also incorporate additional switchable elements 230. In this
- 20 fashion, first module 120 may incorporate a number of switchable elements,  $N$ , indicated generally at 236 whereby each switchable element may be activated between a first state (0-state) and a second state (1-state) corresponding to a first focal length and a second focal length, respectively. Examples of switchable elements 170, 200 include without limitation liquid crystals (LCs), holographic optical elements, polymer-dispersed liquid crystals, nonlinear optical
- 25 lenses, electro-optic elements, electro-optic lenses, LC lenses, LC prisms, LC gratings, LC shutters, LC aperture stops, LC irises, polymer dispersed liquid crystals, switchable holographic optical elements (HOEs), polarization rotators, isotropic, uniaxial, biaxial and/or other anisotropic optical materials, deformable mirrors and deformable gratings, and micro-electro-mechanical systems (MEMS) and MEMS mirrors. Similarly, a second module 240 and third
- 30 module 250, and in general, any number of additional modules (not shown), may be incorporated in system 110.

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Please replace the paragraph beginning on page 5, line 4 and ending on page 5, line 7 with the following amended paragraph:

- 5 For the ~~remainder~~ remainder of this discussion, the parenthesis (*state*) will be dropped from the symbol  $\delta_{m,n}$  for simplification. It follows that a  $\delta_{m,n}$  will be specified for each switchable element  $n$  in module  $m$ . Also, it will be seen that  $\delta_{m,n}$  is similar to delta functions commonly used in the field of Fourier analysis.
- 10 Please replace the paragraph beginning on page 13, line 10 and ending on page 14, line 24 with the following amended paragraph:

Referring now to FIG. 4, a stack of switchable elements according to an embodiment of the present invention is shown and indicated generally at 800. Stack 800 includes switchable  
15 elements, generally indicated at 750, 752, 754. While three elements 750, 752, 754 are shown, any number may be employed in stack 800. Elements 750, 752, 754 may each include a liquid crystal lens interposed between substrates 832, 834, 836, 838. Substrates 832, 834, 836, 838 are at least partially transparent to light 820, 830 transmitted through stack 800. Substrates 832, 834, 836, 838 may comprise glass, plastic, acrylic resin, polymer, crystal, thin films or other materials  
20 known to provide a structure for layered electro-optic devices. Substrates 832, 834, 836, 838 each have a first substrate surface and a second substrate surface 839 and 840, 842 and 844, 846 and 848, 850 and 852, respectively. At least a portion of substrate surfaces 839, 840, 842, 844, 846, 848, 850, 852 can include an antireflection coating as may be desirable for minimizing the loss of light 820, 830 transmitted through stack 800. At least a portion of substrate surfaces 840,  
25 842, 844, 846, 848, 850 are deposited with a generally transparent electrical conductors such as indium tin oxide or conducting polymer. Deposited on the conductive substrate surfaces 840, 842, 844, 846, 848, 850 are lens function layers 860, 862, 864, 866, 868, 870. Lens function layers 860, 862, 864, 866, 868, 870 may consist of materials that may patterned and include without limitation polymer, epoxy, polymer-dispersed liquid crystal, poly (methyl methacrylate)  
30 (PMMA) or photoresist. Lens function layers 860, 862, 864, 866, 868, 870 are at least partially

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transparent to light 820, 830 transmitted through stack 800. A portion of the lens function layers 860, 862, 864, 866, 868, 870 also are patterned such that the thickness, index of refraction, transmittance, scattering, absorption or other optical property of each layer spatially varies, and, in turn, may perform a phase, amplitude and/or frequency modifying function on light transmitted through the layers. Lens function layers 860, 862, 864, 866, 868, 870 may be patterned using techniques that include without limitation as optical lithography, electron-beam lithography, UV light exposure, holographic, laser or other interferometry, or contact pattern transfer from a patterned substrate to a portion of the lens function layers. Preferably, lens function layers 860, 862, 864, 866, 868, 870 are patterned with a lens function including without limitation, the optical properties of lenses such as thin, thick, Fresnel, concave, convex, binary, diffracting, aspheric, on-axis, off-axis, cylindrical, holographic and other lenses. Lens function layers 860, 862, 864, 866, 868, 870 may also include alignment grooves or additional alignment layers to provide a desired orientation or alignment of liquid crystal monomers. Lens function layers 860, 862, 864, 866, 868, 870 are preferably separated by spacers 880, 881, 882, 883, 884, 885. Spacers 880, 881, 882, 883, 884, 885 serve to provide cells 890, 892, 894 between adjacent pairs of layers 860, 862, 864, 866, 868, 870, and may comprise such materials as mylar, photoresist, glass fiber, glass or plastic spheres or other films or materials of generally uniform or controlled thickness. At least a portion of cells 890, 892, 894 are filled with liquid crystal fluid 900, 902, 904. Liquid crystal 900, 902, 904 may include without limitation one or more of a liquid crystal material, liquid crystal, doped liquid crystal, doped liquid crystal material, a nematic liquid crystal, a nematic liquid crystal material, a ~~smetic~~ smectic liquid crystal, a ~~smetic~~ smectic liquid crystal material, a ferroelectric liquid crystal, a ferroelectric liquid crystal material or a polymer dispersed liquid crystal material. Conductor surfaces 840, 842, 844, 846, 848, 850 are connected to control cables 910, 912, 914. Control cables 910, 912, 914 are connected to controller 772. Controller 772 provides voltage to control cables 910, 912, 914 and provides electric fields across pairs of conducting surfaces 840, 842, 844, 846, 848, 850 which control the molecular orientation of liquid crystal 900, 902, 904.

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Please replace the paragraph beginning on page 16, line 23 and ending on page 17, line 8 with the following amended paragraph:

A fourth lens function layer 866 is deposited on second spacers 882, 883 thereby forming a second cell 892. Fourth lens function layer 866 may include a number of optical phase- and/or  
5 amplitude- modifying functions. Fourth lens function layer 866 is deposited on a third  
conductive surface 1182. Third conductive surface 1182 is deposited on a second transparent  
film 1102. Second transparent film 1102 may be comprised of optically transparent materials  
including without limitation glass, vinyl-acetate, plastic or polymer. Second transparent film  
1102 may include an optical phase modifying function imbedded in it. A fifth lens function  
10 layer 868 is deposited on second transparent film 1102. Fifth lens function layer 868 may  
include a number of optical phase- and/or amplitude- modifying functions. Third spacers 884,  
885 are deposited on fifth polymer layer 868. A sixth lens function layer 870 is deposited on  
third spacers 884, 885 thereby forming a third cell 894. Sixth lens function layer 870 may  
include a number of optical phase- and/or amplitude- modifying functions imbedded in it. Sixth  
15 polymer layer 870 is deposited on a fourth conductive surface 1184. Fourth conductive surface  
1184 is deposited on a second transparent substrate 1200. Liquid crystal material 1206, 1207,  
1208 is deposited in cells 890, 892, 894, respectively. Liquid crystal may include one or more of  
a liquid crystal material, liquid crystal, doped liquid crystal, doped liquid crystal material, a  
nematic liquid crystal, a nematic liquid crystal material, a ~~smectic~~ smectic liquid crystal, a ~~smectic~~  
20 smectic liquid crystal material, a ferroelectric liquid crystal, or a ferroelectric liquid crystal  
material.